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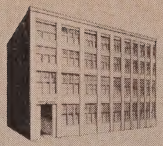

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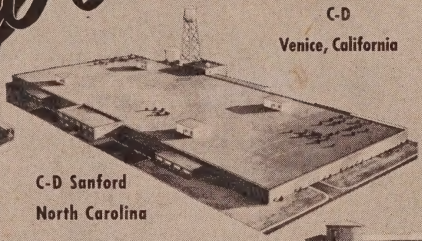

C-D Sanford
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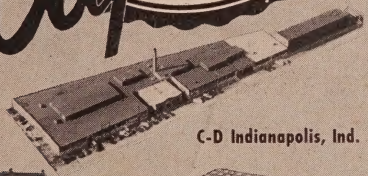
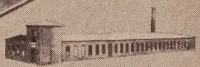
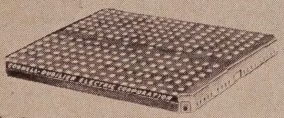


C-D Indianapolis, Ind.



C-D Hope Valley, R.I.

C-D
Providence, R.I.



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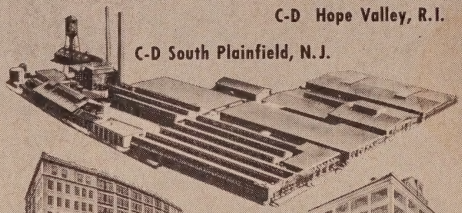

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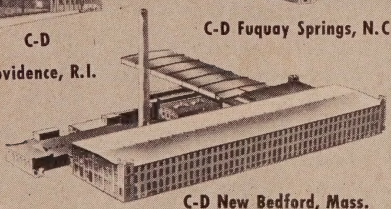

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Vol. 23 MARCH, 1958 No. 3

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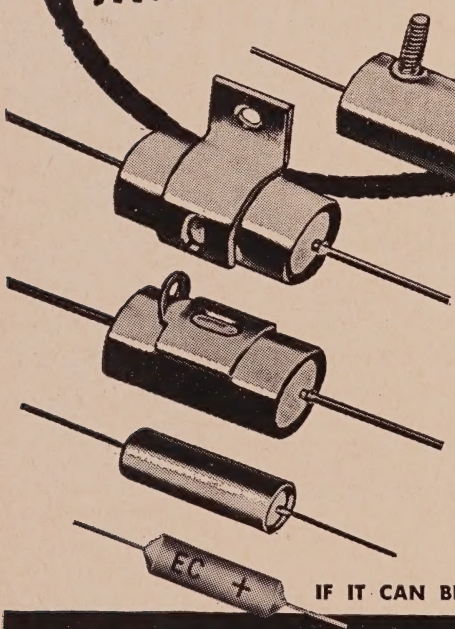

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CONELRAD CIRCUITS

The requirements for conelrad compliance may be met with various equipments. The simplest method perhaps is to use a conventional broadcast receiver for continuous aural monitoring of any selected station and for quick tuning to either the 640- or 1240-kc emergency frequency. Completely aural monitoring is not suitable at most radiotelephone stations, however, since the volume must be kept to impracticably low levels to prevent rebroadcasting. This method is entirely feasible at c-w stations or in transmitter rooms isolated from the microphone.

Conelrad systems may be classified according to whether they are (1) indicators (aural, visual, or both), (2) control devices (actually switching the transmitter off when the monitored station leaves the air), or (3) a combination of the two — that is, controller-indicators. Individual prefences govern the selection. Neither type may be termed superior to the other unless all factors of installation and required service are considered. The degree of circuit complexity likewise depends upon the required sensitivity, permissible power drain, and the type and number of functions to be performed.

Power-Line vs Battery Operation

Regardless of the type of conelrad device considered, the question is apt to arise as to whether it should be operated from the power line or be battery-powered. Therefore, the leading aspects of the problem should be considered here.

First of all, power-line operation has the advantage of requiring little or no maintenance. But power line failure throws the equipment out of operation. To be sure, a power failure would disable the transmitter, as well as the conelrad receiver, so that the station automatically would be shut down. But what about the station equipped with an emergency, battery-operated or engine-generator-powered transmitter? This station would be able to resume transmissions during the failure and would need its conelrad equipment. In the event of a general power failure during an attack, the key broadcast station for the area might turn to emergency power supplies for public safety transmissions, and other stations would need battery-operated receivers for listening on 640 or 1240 kc.

All of these considerations point up the possible desirability of battery-operated conelrad equipment at fixed stations where a-c power is available. The portable station, unless powered by an engine-driven generator, necessarily is battery-operated and so must be its conelrad receiver.

CORRECTION

On Page 5 of the article appearing in the December, 1957, issue of "The Capacitor," the sentence beginning in the 5th line of the left hand column should read as follows: "The d-c output voltage E_2, is equal to $IR = E_1$ minus the voltage drop across the tube."

In the same article, on Page 9, the text in line 35 of the left hand column should read: "(i.e., 2.82 x E_1 rms, etc.)."

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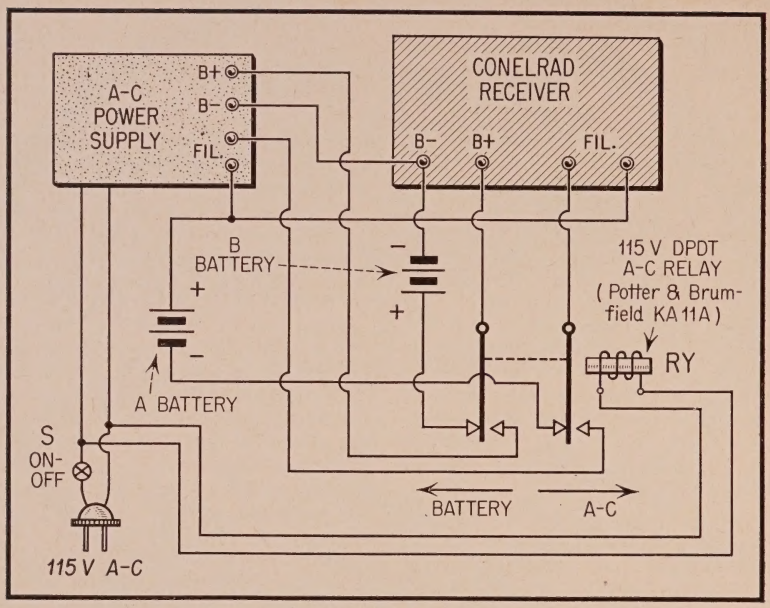


Fig. 1. AC-DC Automatic Changeover.

It should be recognized, however, that conelrad monitors must operate continuously over long periods. Under such conditions, conventional battery operation of tube-type equipment is expensive, as regards both initial cost and maintenance. If the equipment is left running accidentally when not in use, the life of both A and B batteries is seriously shortened if not terminated completely. This consideration precludes the practical use of batteries, except during short-term emergency periods, unless the equipment is transistorized. The current drain of a transistorized receiver is so low that no serious consequences are caused by occasionally forgetting to turn the set off. Furthermore, the batteries for such a receiver may be of the inexpensive flashlight type which are readily obtainable at almost any store.

Required Sensitivity

The required sensitivity of a conelrad receiver depends upon the distance and power output of the stations to be monitored. Very little sensitivity is needed for strong, local stations. The same is true for very near low- and medium-powered stations. Under such conditions of "local" reception, the complexity of a superheterodyne usually is not needed, a selective tuned r-f or tuned-detector receiver being adequate, especially if a good outside antenna and ground are employed. When operation from a self-contained antenna is desired, maximum sensitivity is necessary and a superhet is mandatory.

When the monitored station is located at some distance and/or is low-powered, high sensitivity is required in the conelrad receiver. Here, the

superhet is necessary and should be operated from a good outside antenna and ground unless performance tests show that maximum response can be obtained with indoor or self-contained antennas.

There is no adequate rule-of-thumb by means of which the minimum required sensitivity can be determined. The reason for this is that many variables influence the received field strength. Reliable reception at all times is the major requirement of the conelrad receiver. However, experience would indicate that insensitive circuits (simple detectors and trf types) should be employed only for monitored stations within 10 miles airline having carrier power of 1 kilowatt or higher, and then only with a good outside antenna. Under all other conditions, use a superhet. When the station is more distant than 10 miles airline, use a superhet with outside antenna.

Emergency Power Changeover

Since conelrad service must remain uninterrupted during the operating shift of a monitoring station, additional reliability is afforded by any means for automatically switching an ac-operated conelrad receiver to battery operation in the event of power failure.

Figure 1 shows a simple arrangement for accomplishing this changeover. Here, the small, dpdt a-c relay (RY) is the automatic switch. When the a-c power is on, this relay is held in by current from the 115-v line and connects the receiver to the a-c power supply. If the a-c power is interrupted, the relay is released and connects the receiver, through its other pair of contacts, to the A and B batteries. Upon resumption of power service, the relay disconnects the batteries and returns the receiver to the power supply. This arrangement is fast acting and requires no attention. While shown separate for simplicity in Figure 1, the a-c power supply and batteries may be self-contained in the receiver.

The small relay may be installed on the chassis of a 3-way portable radio to provide this automatic changeover service in this type of receiver in which both the batteries and a-c power supply are self-contained.

Receiver Circuits

Figures 2 and 3 show two of the

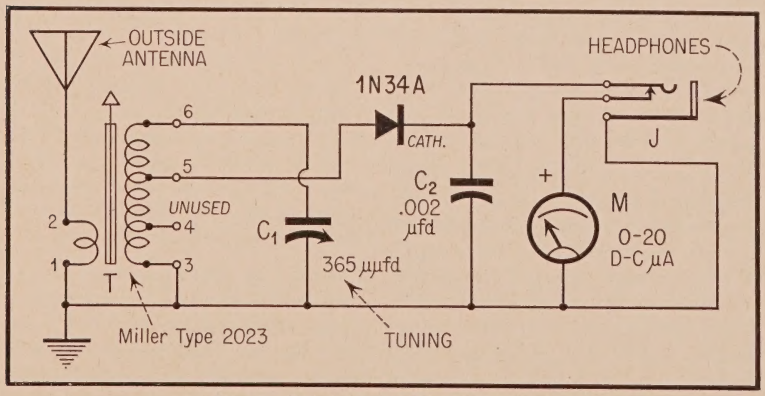


Fig. 2. Simple Aural-Visual Receiver.

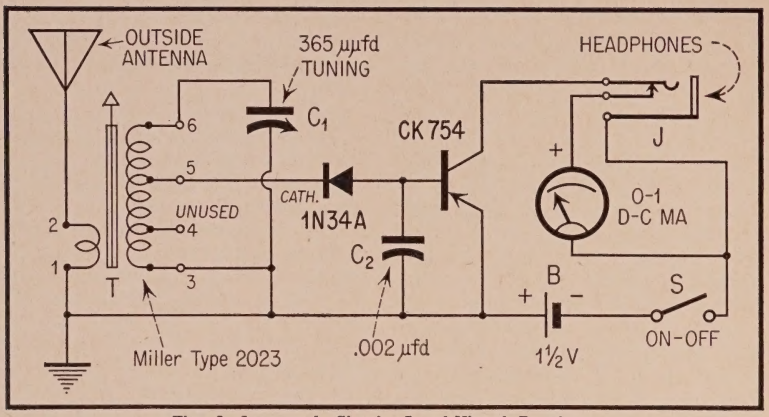


Fig. 3. Improved, Simple Aural-Visual Receiver.

simplest circuits which may be used for combined aural and visual indications. Each is tunable throughout the standard broadcast band by means of a single tuning control, C_1. The r-f transformer (T) is a miniature, transistor oscillator coil (Miller Type 2023). Initial alignment is performed by adjustment of the tuning slug of this transformer.

The circuit in Figure 2 is the simpler of the two and requires no local power supply of any kind. It is also the least sensitive and is satisfactory only for use with strong, nearby local stations. Nevertheless, it is stable and reliable in high field strength areas.

The detector is a 1N34 diode. Peak deflection of the 0-20 d-c microammeter is obtained at resonance, and tuning is fairly sharp because of the high Q of the inductor and the impedance-matching tap for the detector circuit. When high-impedance magnetic headphones (2000 ohms or higher) are plugged into jack J, the microammeter automatically is disconnected and visual indications are supplanted by aural ones. If the meter is left in the circuit, it will lower the audio volume.

The circuit in Figure 3 employs a d-c amplifier to boost the d-c output of the 1N34 diode detector. This allows the use of a more rugged 0-1 d-c milliammeter as the visual indicator and provides higher sensitivity than the circuit given in Figure 2. The basis of the d-c amplifier is a high-beta transistor, CK754. This transistor is operated from a single, 1½-volt, Size-D flashlight cell, B. No zero-set rheostat is required. When magnetic headphones (2000 ohms or higher resistance) are plugged into jack J, the milliammeter automatically is disconnected and the transistor serves as an audio amplifier to boost the headphone signal.

A receiver employing either of these circuits is used mainly as a visual indicator. Deflection of the meter indicates that the monitored station is on the air. The deflection is steady, since it is proportional to the carrier, not

to the modulation. Interruption of the carrier is signalled by a fall of the pointer to zero. When this happens, the headphones may be plugged in and the receiver tuned to either 640 or 1240 kc. The latter two frequency points should be marked plainly on the C_1 dial.

In some instances, loudspeaker operation will be preferred to headphone reception. The transistorized audio amplifier shown in Figure 4 will serve this purpose. The CK722 Class-B output amplifier stage delivers approximately 100 milliwatts to the 3.2-ohm loudspeaker. The primary winding of input transformer T_1 may be connected to a phone plug for insertion into jack J in Figure 2 or 3. The amplifier then will be available for other purposes when the station is not in operation. Insertion of the plug automatically disconnects the indicating meter in the simple receiver circuit.

A complete superheterodyne circuit is not shown here. The reason for omitting it is that ready-made midget broadcast receivers suitable for conelrad purposes are readily available at prices lower than the experimenter can duplicate by building a set. Also, transistorized superhet receivers are available in comparatively inexpensive kit form for private assembly. These receivers are suitable, as supplied, for aural indications.

There are several ways of adding a visual indicator to a superhet circuit. (1)A 0-100 d-c microammeter may be installed in series with the second detector diode. When a tube-type

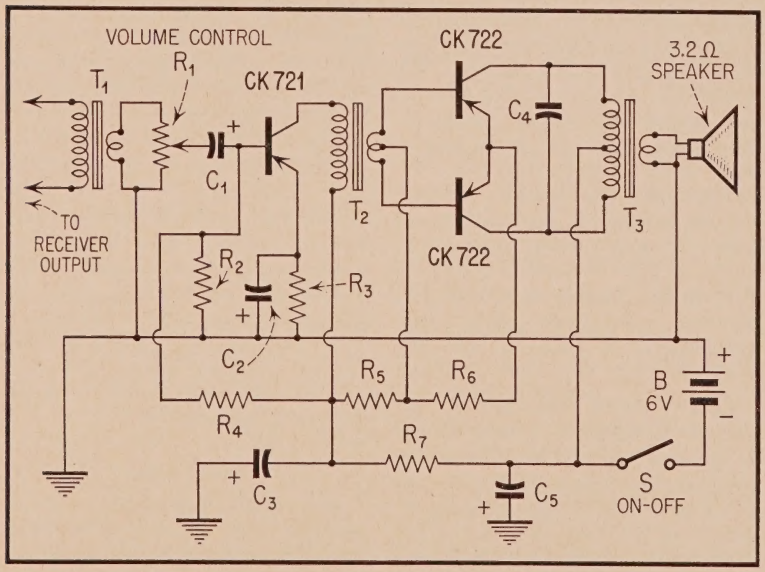


Fig. 4. Loudspeaker Amplifier for Simple Receivers.

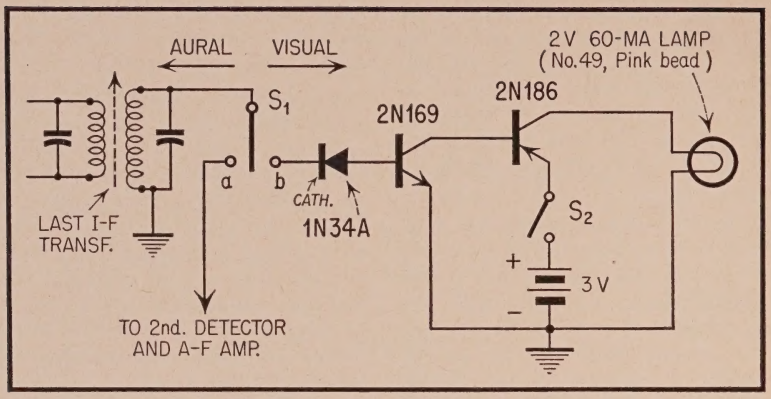


Fig. 5. Lamp-Type Indicator Circuit.

diode is used, a reverse d-c voltage (obtained from the power supply through a 1- megohm rheostat) must be applied to the meter to buck out the steady d-c diode current due to contact potential of the tube. When a crystal diode is used as the second detector, no bucking voltage is required. Any one of the standard S-meter circuits used in tube-type communications receivers also may be employed to give visual on-the-air indications via a d-c milliammeter. (2) A magic eye tube may be operated in the conventional manner from the second detector- avc circuit, to provide visual indication of monitored-station operation. However, this type of indicator requires closer viewing than is necessary with the meter.

Figure 5 shows how a separate circuit may be added to a transistorized or tube-type superhet for a lamp-type indicator. The lamp glows as long as the monitored station is being received and goes out when the carrier is interrupted. Maximum brilliance occurs at exact resonance. Two additional transistors and a crystal diode are required. The transistors are NPN (General Electric 2N169) and PNP (General Electric 2N186). The diode is a 1N34A. The transistors are direct-coupled in a simple d-c amplifier circuit. The 2-volt, 60-ma pilot lamp is connected in the collector output circuit of the second transistor. The 1N34A rectifies the i-f signal. When switch S_1 is thrown to its Position b, the amplifier input is connected across the secondary of the last i-f transformer and visual indications are obtained from the lamp. When S_1 is thrown to Position a, the amplifier and lamp are disconnected and the i-f signal is applied to the second detector and audio circuits for aural monitoring. A brighter, 6-volt pilot lamp may be used if the auxiliary battery voltage is increased to 7.5 v.

Relay Circuit

Figure 6 shows an automatic carrier-operated relay which may be added to a transistorized or tube-type superset. When the carrier of the moni-

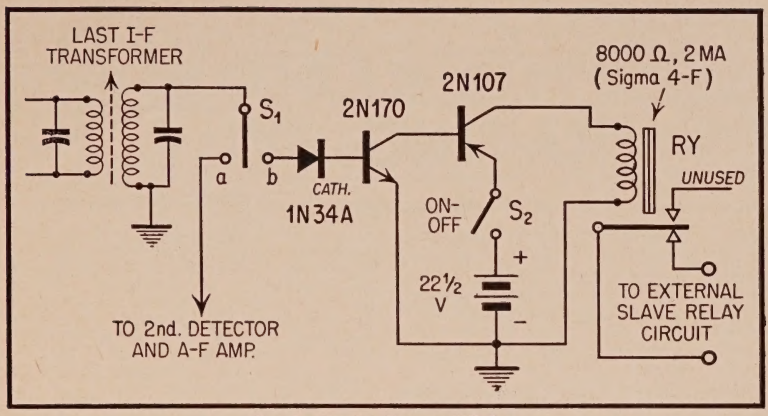


Fig. 6. Carrier-Operated Relay.

tored station is interrupted, this relay system automatically will switch-off the transmitter.

Like the preceding circuit, this relay circuit utilizes a direct-coupled, transistorized d-c amplifier connected to the last i-f transformer secondary through the spdt changeover switch, S_1. When the latter switch is thrown to its Position b, the 1N34A crystal diode rectifies the i-f signal and the resulting direct current is delivered to the d-c amplifier. The amplified current picks up the relay (RY) opening its lower contact. If the carrier is interrupted, the resulting loss of direct current allows the relay to drop out, closing the circuit through the lower contact and actuating an external, high-current, slave relay which switches-off the transmitter. When switch S_1 is thrown to its Position a, the i-f signal is delivered to the second detector and audio amplifier of the receiver, and aural monitoring is afforded.

PARTS LIST FOR FIGURE 4

B—Four 1½-v, Size-D flashlight cells connected in series

C_1, C_2, C_3, C_5—25 ufd, 10 v, miniature electrolytic — (C-D NL 25-10)

C_4—0.05 ufd, 200 v tubular — (C-D CUB 2S5)

R_1—25,000-ohm potentiometer

R_2—2200 ohms ½ watt carbon

R_3—820 ohms ½ watt carbon

R_4—10,000 ohms ½ watt carbon

R_5—5000 ohms ½ watt carbon

R_6—120 ohms ½ watt carbon

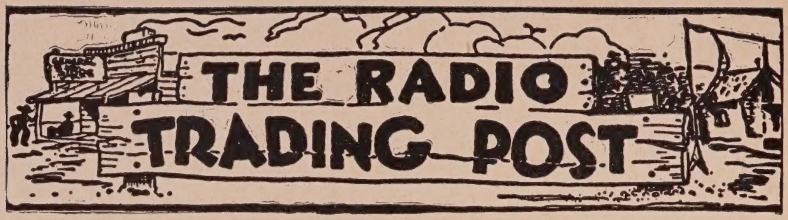
R_7—100 ohms 1 watt carbon

S—Spst switch on volume control potentiometer R_1

T_1—Transistor interstage transformer — Thordarson TR-14

T_2—Transistor driver transformer — Thordarson TR-7

T_3—Transistor Class-B output transformer — Thordarson TR-27



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WANTED — Garrard 121 turntable in good cond., tape recorder, VOM tester, radio-TV course, text books. J. T. Wentworth, 4269 Packingham Dr., Springhille, Ala.

FOR SALE — My late husband's NRI Radio-TV course; Sylvania tube manual, both late editions. Best offer. Mrs. Betty Fowler, Wilcox, Pa.

WANTED — National SW-3 rcvr. with coils. Andrew Frederick, 520 Spruce St., Philadelphia 6, Pa.

SELL OR TRADE — Approx. 100 I. R. E. proceedings, 1948-1957, 50 cents each or swap for FM tuner or audio amplifier. Herbert C. Roshkind, 27 Whitney St., Westport, Conn.

FOR SALE — Leeds & Northrup DC bridges. Type S test set for ordinary resistance testing as well as Murray and Varley loop tests. Set No. 5300, $140; Type U 5430-A with many other loop tests, $190. FOB. Emil Backstrom, Jr., 5235 N. Winthrop Ave., Chicago 40, Ill.

WANTED — Schematic for BC-348-R rcvr. J. Pietropaolo, 243 Center St., Canandaigua, N. Y.

SELL OR TRADE — RCA 8TR3 Hi-Fi tape recorder in orig. carton. $140 FOB or excellent receiver. Robert Spinillo, 565 No. Coles, Maple Shade, N. J.

SELL OR TRADE — 9-tube comm. rcvr., 75 Kc to 18 Mc, BFO, audio filter, AVC, stand-by, self-contained speaker, black crackle finish case, for a Heathkit W-3A amplifier. Gordon Soderlund, 1303½ Carlton Dr., Glendale 5, Calif.

FOR SALE — Gibson guitar (L-5C) Cutaway with D'Armond pickup, 14 w. amplifier, twin spkr., built-in Tremelo circuit. Cost $650, 5 mos. old, for $395 complete. Art Epstein, 1338 Noble Ave., Bronx 72, N. Y.

FOR SALE — '52 Ford radio, less spkr.; '47 Olds radio; Admiral, GE, Dumont service manuals; Fotofacts; RCA, GE service courses; TV servicing books; 10" Sylvania TV. Want '51 Ford radio. Fred Levitt, 224-15 135th Ave., Laurelton 13, N. Y.

WANTED — RCA Pictoguide, Vol. I. State condition and price. Sidney Schrier, 1 Bittersweet Lane, Valley Stream, N. Y.

FOR SALE — Ampro 731 tape recorder, $50; 8 mm. movie camera and projector, $95. John Latone, 97-22 131st St., Richmond Hill, N. Y.

FOR SALE — Electrox AR-1 battery eliminator, 115 v. AC input, 6 v. DC output; RCA oscillograph TMV-122-B, with instructions, $15 each, both for $25. Bob Bauman, Milton, Wis.

FOR SALE — Hi-Fi output transformers, perf., Thordarson T-65S94 and T-67S52, push-pull, shielded, in original carton. Make offer. Peter Robie, 559 Pleasant St., South Weymouth 90, Mass.

SWAP — 2¼ x 2¼ Rolleiflex camera f3.5, Tessar lens, plus extras, excellent condition, for tape recorder. P. R. Sable, 39-40 Greenpoint Ave., Long Island City 4, N. Y.

WANTED — To buy, rent, or borrow instruc. manual for Heathkit 0-5 scope. Louis A. Henchen, R. 3, Box 217, Neillsville, Wis.

FOR SALE OR TRADE — Sylvania 132 7" scope, good cond.; Precision sig. gen.; tubes, relays. Want Hi-Fi equipment. Prefer local. R. Kline, 6458 Hayes Dr., Los Angeles 48, Calif.

WANTED — Heath voltage calibrator; electronic switch; signal generator; other test equipment for cash or trade for ham gear, tubes, parts. William Toben, 1244 W. Schafer Dr., Tucson, Ariz.

WANTED — Bug semi-automatic key, Vibroplex, or Johnson Speed-x only, reasonable. Gary Wheaton, 60½ Stewart, Athens, Ohio.

FOR SALE — RCA movie theater mid-range driver and horn; magnet weight 23 pounds, perf. condition, $50. Paul Richter, 1448 Webster Ave., Bronx 56, N. Y.

WANTED — Set of 2 transceivers for operation in 465 Mc Citizens band, similar to Vocaline. Al's TV, 222 East 38th St., Tacoma 4, Wash.

FOR SALE OR TRADE — Ham gear. Send for full list. Ralph Miller, 7 Lorne St., Dorchester 24, Mass.

WANTED — Used four-drawer steel file cabinet, tape deck. For sale: Regency ATC-1 transistor mobile converter, $45; 15 amp., 115 v. AC TVI power line filter, $10. K. Miller, 14979 La Cumbre Dr., Pacific Palisades, Calif.

FOR SALE — Unused NRI sig. tracer, $40; NRI Radio-TV course, other valuable books, $25; Emerson 17" TV console, $10. Want elec. course. Ernest Beard, R. 1, De Motte, Ind.

SELL OR SWAP — Shopsmith, all accessories, new 1956, value $900; 14" bandsaw, speed changer, wood or metal, ½ hp motor. Want Hickok test equip., lab scope. Hugh G. Stacey, 4 Dartmouth St., Natick, Mass.

SELL OR TRADE — Chassis only, Emerson 609A projection TV; Norelco Protelgram with 3NP4 tube & power supply. Needs work. Prefer local. Bill Rosenfeld, 1220 Morris Ave., Bronx 56, N. Y.

FOR SALE — RTTA Radio and TV course, complete with all lessons and TV set, $75; 4 x 40 field glasses; 300 pwr microscope; Electrical Math. course, ea. $2.50; Elements of Electronics, $4. J. Wilson, 1687 Daley Rd., Lapeer, Mich.

WANTED — Triplett model 1200A VOM with twin meters, has low scale. State price, condition. Thomas Radio Service, Box 244, Triumph, Minn.

SELL OR TRADE — 12" Operadio Electromagnetic spkr. and 78 rpm turntable and amplifier. James C. Wilson, Rt. 1, Box 405, Empire, Ala.

SELL OR SWAP — CREI TV Engineering course; 15 meter crystal converter. Want CRD rotator, FM tuner, or what have you? Thomas A. Hughes, 116 Bouchard Ave., Dracut, Mass.

FOR SALE — Carter dynamotor, input 6 v. DC, output 400 v. DC, 1375 amps., $25. Walter A. Williams, 237 New Brunswick Ave., Fords, N. J.

FOR SALE — 25 w. PA amplifier, two mikes, two phono inputs, four spkr outputs, with 78 rpm phono, $25; Heathkit A9B amplifier, $25; Recoton cartridge, unused sapphire, diamond about 500 hrs left, $8. All work perfectly. L. Wilder, 2160 Holland Ave., Bronx 62, N. Y.

SWAP — Like new Arco saw for ¼" electric drill, list price $12.50, for radio parts or tubes. James Hill, 110-26 175th St., Jamaica 33, N. Y.

WANTED — May '47 issue Tele-Tech magazine. Have old band 42-50 Mc FM tuner Motorola, Heath Q meter, impedance bridge, Motorola TV, HQ129X. F. D. Bornman, 19491 Lowell Dr., Detroit 3, Mich.

FOR SALE — Harrison antenna coupler, $16.50; Millen SWR bridge, $9.50; LW-60 2-meter converter, $11.50; Radiart Vibropak 12 v. in, 150 v. out, $4.50; center load mobile antenna, $13.50. Deal for 10-meter vertical coax antenna. P. Snyder, 58 Pace Dr., Babylon, N. Y.

SELL OR SWAP — Superior 450A tube tester, guaranteed perf., with built-in condenser checker, $20 COD or ???? Thompson Radio, 403 Smith, Bay City, Mich.

SELL OR TRADE — Excellent tunable 2 meter converter and 2 meter xmitter; 4X150A's; 630 TV set, 4 element, 10 meter or 15 element 2 meter beams; Gonset noise clipper, 522 xmitter. Need TV ant. rotator; Heathkit ignition analyzer; Mon-key. Walter Zmetronak, 147 Farview Ave., Paramus, N. J.

FOR SALE — SX100 and Johnson Pacemaker, both exc. cond. for best cash offer. W. C. Thomas, 3529 South Drew Valley Rd., Atlanta 19, Ga.

FOR SALE — Heath TC-2P portable tube checker, TV picture tube adaptor, in excellent cond., $45; Philco 7050 tube tester, approx. 7 yrs. old, $25. Michael Bilgrei, 146 Hewes St., Brooklyn 11, N. Y.

FOR SALE — Handset TS-13-C, $3.50; radio parts and science fiction mags. McGhee, 463-81st St., Niagara Falls, N. Y.

FOR SALE — Hallicrafters SX-28 receiver with matching speaker, excellent condition, $95 plus shipping. E. P. Sadler, 398 Sigourney St., Hartford, Conn.

FOR SALE — National Union Vol. 3 by Rider; Radio News 1927-1932; Everready model 1 radio. Want radio called "Radio Keg," International or Pilot all-wave 11 T. C. E. Peters, 2925 Apple St., Lincoln 3, Neb.

WANTED — Low price 3" or up scope; sig. gen.; state price, make, and condition. Clyde W. Runnels, 412 Eastern Ave., Washington C. H., Ohio.

FOR SALE — Hammerlund HQ-129X comm. rcvr and matching Hallicrafters speaker, $140; receiver alone, $125. William Ungvarsky, 157 Hawthorne Ave., Yonkers, N. Y.

FOR SALE — Riders 6 thru 13, $4 each; TV manual Vol. 1, $6; Simpson 305 tube tester, $15 plus shipping. All good condition. C. LaBrake, 18 Iris Lane, New Hyde Park, N. Y.

SELL OR TRADE — Warners Plastic Sealing Press, 1. n., with equipment for making albums; Packard-Bell table model radio, needs some repair. Want up-to-date tube tester, VTVM, Solar 160 capacitor-resistor analyzer. R. C. Wilmarts, Box 546, Elsinore, Calif.

FOR SALE — Telrad 18A freq. standard mfd. by Garner Co., Chicago, with operating instructions, $25 postpaid. Ernest Schultz, 2837 Goddard Rd., Toledo 6, Ohio.

WANTED — Signal Corps adapter kit for tube tester T-177B, mfd by Simpson; set of tube test data cards for same. C. F. Curtis, Box 464, Schertz, Tex.

FOR SALE — Practical Electricity, Electrical Design, Electrcial Engineering, all three for $10; elec. motor 115 v. AC, 1/4 hp, 1600 rpm, 60 cy., $12; battery eliminator, $10. Noble Travis, R. 3, Marion, Ky.

FOR SALE — 7" Motorola table model, $18; 10" Admiral console and 10" Emerson table model, $25 each. Harry Ruman, 120-51 232 St., Cambria Heights 11, L. I., N. Y.

WANTED — TV servicemen from Hudson, Bergen, Passaic, and Essex Counties to join a newly formed Television Technicians Assn. Write Thomas Palazzo, 12 Edison St., Ridgefield Park, N. J.

WANTED — Will pay good price for Gernsback's "Modern Electrics" magazines, 1908 to 1913; also Govt. call book, "Radio Stations of U. S.," 1925; and ARRL "List of Member Stations," 1915-1916. Ed G. Raser, 315 Beechwood Ave., Trenton 8, N. J.

FOR SALE — Admiral radio-phono comb., 78 rpm, $25; ATR inverter 350 w., $20; 3-speed record changer, $20; old tubes. J. Kramer, 229 E. 7th St., New York 9, N. Y.

WANTED — Fundamentals of Radio (1938) and Radio Engineers Handbook (1943), both by Terman, in good condition and cheap. E. L. Neill, Box 33, Cleburne, Tex.

FOR SALE — Viking Ranger, factory wired, good condition, $195; Viking 6N2, like new, $115 FOB. Frank Tefft, 209 Walnut St., Alma, Mich.

SELL OR TRADE — NC-240D with matching speaker, 2-meter xtal convert., with power supply; Hall. HT-18, 813 final with built-in pwr. supply in Bud cabinet. All A-1 shape with instructions. S. B. Weidner, Jr., 127 So. Main, Ottawa, Kan.

FOR SALE — Best offer. Single control 813 final xmtr., VFO, AM, PM, and CW on 20, 40, 80, on rugged rack and dolly, TVI'd. Local preferred. M. P. Ekas, 6106 No. 7th St., Philadelphia 20, Pa.

FOR SALE — 100 w. CW rig for 40 meters, neat 2-deck rack with high and low voltage supplies, ARC-5 transmitter, tube keyer, antenna relay, low-pass filter, worth $100. Best offer over $40. R. B. Fairchild, 213 Newtown Street Rd., Newtown Square, Pa.

SELL OR TRADE — Hermetic seals to fit ½" hole, with 8 leads, 25 cents each; miniature relay cans. James A. Fred, Russiaville, Ind.

FOR SALE — Kilowatt transmitter: push-pull 250TH final, 810 modulator with clipping and filtering, 3500 v. DC, one ampere supply, variac controlled, 2" CRT monitor, TVI enclosed, 10-80 meters, $375. Perry Valente, 5 Summit Terr., Peabody, Mass.

FOR SALE — Heathkit 0-8 5" oscilloscope, A-1 cond., with manual and leads, $40. Mac's Radio & TV, 116 W. Broad St., Linden, Mich.

WANTED — Audio coupling transformer from 6R7 plate to PP 6V6 grids from old Hallicrafters Super Skyrider SX16. Ken Hickman, Box 33, Kenner, La.

SELL OR TRADE — 379 Sams Photofacts and 150 Service Manuals, in binders; 17" TV sets. E. G. Bartlett, Box 134, Atlanta, Mo.

FOR SALE — RCP 808 tube tester-VTVM combination, $50; Simpson 260 VOM with roll top case, like new, $35; Hallicrafters S38 receiver, $25, and S20R receiver, $35; VHF 152A converter, $50. T. S. Grove, Box 50, Factoryville, Pa.

FOR SALE — Sprayberry Radio course with kits, $55. W. N. Sullivan, 3312 Downing St., Jackson 6, Miss.

SELL OR SWAP — Superior TV-40 CRT tester; Eico 536 1,000 ohms per volt Multimeter. Cash or swap for 6-12 v. batt. eliminator. Both like new cond. Arthur Crabb, 7740 Oak, Kansas City, Mo.

FOR SALE — 12 v. DC Palco pwr supply, $25; model 670 multimeter, $15; RME DB-23 preselector, $37.50; Precision E-200-C sig. gen., $55; chokes, $6 and $7.50. H. H. Wesebaum, 270 North Olive St., Elyria, Ohio.

POSITION WANTED — 4th year Columbia University Industrial Engineering student with electronics experience desires work in industry this summer (New York City area preferred). R. E. Zapolin, 1466 Beach Ave., New York 60, N. Y.

FOR SALE — PA equip., with nine loudspeakers, three mikes, 3 amps., etc., $900 or best offer. Walt Radio, 1017 So. Sherman St., Bay City, Mich.

WANTED — Radio Craftsman 800 AM-FM tuner, in perf. cond. State price. Jack Teitler, 9 Target La., Levittown, L.I., N.Y.

WANTED — A8-3 Jensen type A, 800 cycle crossover network, 16 ohm. State price and condition. John G. Bitel, 282 Ringwood Dr., Wantagh, L. I., N. Y.

FOR SALE — Unused Shure mikes, mod. 55 S-Unidyne, dynamic, mul. imp.; and mod. 707 crystal mike. Best offer. Warren Martin, 100-08 Francis Lewis Blvd., Hollis, N. Y.

WANTED — Midget recorder and novice band transmiter, A-1 working order. Give specifications and price. Eldon E. Long, 23 So. Main St., Jeffersonville, Ohio.

FOR SALE — Scintillation counter, Detectron DS-277, six settings 5. to .025, used slightly, cash $85. R. Schillins, 9 Zeliff Ave., Little Falls, N. J.

FOR SALE — Late model Collins 75A4, Serial No. 3954, all factory wired modifications with 3.1 and 6 Kc filter in orig. carton, $610; factory wired 20A with 458 VFO deluxe case, $210. R. W. Carlsen, 57 Alda Dr., Poughkeepsie, N. Y.

FOR SALE — Unused 10 meter mobile station, includes Motorola rcvr P-69-13-ARS, xmitter FMT-30-DMS AM-FM, spkr., crystal, mike, control head, battery cables, ready to install, $100 FOB. Steve Billie, 820 Richwood Ave., Morgantown, W. Va.

FOR SALE — WireMaster portable wire recorder, with mike, amplifier, 8" spkr, more than 30 rolls of 1 hour recording wire and complete index of recorded classical music, exc. condition, $125 plus shipping. L. M. Marks, Jr., 14 Lloyd Court, Nutley, N. J.

WANTED — Copies of "Lone Scout" magazine published by W. D. Boyce Co., Chicago, 1915 thru 1924. Cash or swap tubes. Joseph D. Frasca, Box 43, Gardner, Ill.

FOR SALE — Hickok 288X sig. gen., universal crystal controlled, instructions, no RF, $100; Riders 4-6 thru 21, like new, $120; Sprague Tel-O-Mike model 16 with instructions. Trade for good 8 mm. projector. R. E. Martin, 2605 Warren Ave., Seattle 9, Wash.

SWAP — Sprayberry radio-TV course ,for oscilloscope or ham gear. Arthur Welsh, 37 Barren Rd., Newtown Square, Pa.

WANTED — Tech. manual or schematic for Royal Canadian Air Force xmitter-rcvr. ATR11. Steve M. Dyskievicz, 40 Henderson, Danville, Ill.

SELL — Hallicrafters SX43; G.E. 850 spkr. with 500 ohm trans. and wall baffle, 100 kc. xtal calb., elevated front base, $150. FOB. B. Bonney, 925 Northampton St., Easton, Pa.

FOR SALE — About 100 issues of QST and CQ plus few issues of Radio News, $17.50; 4-stage Bogen TV booster, $10; Schick 25 electric razor used, $15. Howard Rapple, 401 N. 2 St., Humboldt, Iowa.

WANTED — We will assemble electronics units by piece or contract, radios, amplifiers, test equipment or other allied equipment. Jones Electronics, Box 368, Hartford, Ark.

FOR SALE — Precision ES-500 scope, $42; Heathkit FM-3A, $25; Heathkit AG-9, $35; Archer S-1D dynamic mike, $10; 10-50L6s, 7-35L6s tubes, $12. S. W. Kovacs, 8605 Emrich Ave., Fern Creek, Ky.

FOR SALE — 3 RCA color picto-guides, l. n., $4 each, plus postage; Oak Ridge synchro-sweep gen. 104; sig. gen. 103, both good cond., $40, plus postage. S. Egelberg, 3029 Matthews Ave., Bronx 67, N. Y.

FOR SALE — NC125 w/speaker plus Heath Q multiplier, $100; Pentron 9T3C, 3¾" and 7½", plus tapes, $90. D. Jaffa, 591 Bristol St., Brooklyn 12, N. Y.

TRADE OR SELL — 2-1/4 x 3-1/4 miniature speed graphic; Zeiss Tessar 3.5 compur rapid and curtain shutters, coupled range finder, pack adaptor and six film holders, good cond. Want good modern test equipment. R. G. Ellithorpe, Route 4, Sturgeon Bay, Wis.

FOR SALE — Hickok 288X, $70; 15 Dahlberg hospital radios, $120; ATR 6VDC to 110AC 75 w. inverter, $15; VM 3-speed changer, $15; Mallory 6RS10 DC supply, $15; Triplett 117B VOM and AM sig. gen., $15. Leo's Radio, Medford, Wis.

SELL OR TRADE — Two facsimile transceivers model TT1B/TXC1, $75 each; two UHF lab. sweep. sig. generators. J. W. Phillips, 37 Biltmore Ter., Belleville, Ill.

SELL OR TRADE — DIR Alliance antenna rotor complete with thrust bearing, l. n, 22 cal. Field King high standard pistol, 5 boxes of ammunition and cleaning rod. Trade for tape recorder in working cond. Al Odegaard, 717 SW4, Valley City, N. D.

FOR SALE — Collins 18J-4 50 w mobile xmitter, with matching Collins 415C-2 6 v. vibrator power supply for operation on 10 M; also 10 M converterette; 1/c E. L. model 2606 mobile power supply — 6 v. in., 300 v. at 100 ma. out. Make offer. RICH-tronic Enterprises, 123 W. 15 St., Holland, Mich.

WANTED — Copy of Applied Mathematics by Carl E. Smith. State cond. and price. J. P. Andrasko, 223 E. 96 St., New York 28, N. Y.

SELL OR TRADE — S38B Hallicrafters, l. n., two 15" speakers; VTVM; boosters; solar cap. analyzer; tenna rotor, gas engine, 3-speed phono turntable; ARB rcvr; elect. motors. Thomas Rohland, R3, Martinsville, Ind.

FOR SALE — HRO 5 RA with matching power supply, speaker, coil rack, coils 50 kc to 7.3 mc and 14 mc to 30 mc, $125. E. R. Adams, 319 9 Ave., Haddon Heights, N. J.

FOR SALE — All l. n.: HQ-129 X-short-wave rcvr, $110; Millen grid dip meter, $40; Hickok 288-X AM-FM sig. gen., $100; Johnson matchbox (250 w), $30; Gonset communicator II (2 m), $135. All fob. Jerome Levy, 2950 Bronx Park East, Apt. 3B, Bronx 67, N. Y.

FOR SALE — Simpson 315 sig. gen.; Precision 915 tube checker, used slightly when new, safe storage since. Best offer. Also tubes, radio parts, manuals, etc. Altig Electrical Service, Greenview, Ill.

FOR SALE — Eico 666R tube tester, used very little, up-to-date roll chart. Make offer. Also 100 No. 51 and 100 No. 47 pilot lamps (Tung Sol) $5 each box; unused "Time All" deluxe electric timer, $5. J. Keithley, 216 Graceford Dr., Aberdeen, Md.

FOR SALE — Hickok 203 VTVM and capacitance checker, in original carton, never used, $49 FOB. W. M. Edwards, 202 East Main St., Homer, Mich.

SELL OR TRADE — 1.5 kw 1800 v. pwr. supply; tubes; RT19 transceiver; PE103 dynamotor; Harvey-Wells TBS50. Need grid dip meter; panodapter; good comm. rcvr; 500w multimath mod transformer. H. E. Owen, Box 851, Alfred, N. Y.

SELL OR SWAP — German tubes, diagrams. Gerhard Kensy, Ullsteinstr. 67, c/o Philips, Berlin, Mariendorf, West Germany.

SELL OR SWAP — Karlson 15" blond oak (table model); Argos 15" mahogany and leatherette, bass reflex; Cathedral 12" blond oak 3-way enclosure; Altec 15" 603B; Magnavox 15" coaxial; two GE 12" S1201A. Want new GE VR-11 head or Hi-Fi. Fred L. Bartlett, 6110 W. 26th St., Cicero 50, Ill.

SELL OR TRADE — Superior's 670-A Super meter volt-ohm milliammeter with manual, $18, or trade for CRT tester and reactivator. L. J. Bylon, 244 West 116 St., Chicago 28, Ill.

TRADE — Eico 315 sig. gen., factory tested. Need FM tuner, VTVM. Also have NRI radio course in 3 binders, 1942 issue, no kits; NRI Service manual Vol. 1. Best offer. H. E. Wood, 1034 Pioneer Rd., Lansdale, Pa.

FOR SALE — 3-way Roland portable radio, slightly used, good cond., $20. H. Dean Pippin, Atlanta, Mo.

FOR SALE — Photocopy equip., complete with timer, $59 postpaid; 3 complete sets Link FM mobile equip. to meet new license requirements, $94 FOB. Paul DiSavino, Box 14, Towaco, N. J.

WANTED — Model steam engine, slide valve action, similar to those in Pop Corn Wagons, advise type, condition, and price. Cash or swap electronic equip. H. P. Westervelt, 2200 Iron Springs Rd., Prescott, Ariz.

WANTED — Copy of Sept. 1951 "Radio and Television News" magazine. Paul W. Conner, 1208 Pullman Rd., Moscow 3, Idaho.

SELL OR TRADE — Argus 3.5 50 mm. Centar with flash, film, and case exc., for cash or small transmitter AT-1, TR-75, or ham gear. G. P. Oberto, 6731 Patterson Ave., Richmond 26, Va.

FOR SALE — Hi-Fi, 12 w. amp. 2-6C4, 2-6AQ5, 1-6X5, phase inverter, push-pull output, no output trans., $10 FOB. R. W. Gorseline,9406 Seminole St., Silver Spring, Md.

SELL OR TRADE — 1947-48 Plymouth car radio; Jackson 634 tube tester; Elec-Voice 634 mike; 12½" Philco TV. Trade for 3-speed record player, 17" TV, or tape recorder. Jim's & Gene's TV and Radio, 33 N. Grupe St., Mt. Carmel, Pa.

WANT — Harvey-Wells TBS-50 transmitter or similar model, 2-80 meters, with AC power supply; also matching Harvey-Wells VFO. Mildred Crowley, Milton Rd., Oak Ridge, N. J.

WANTED — MT-101/ARC-4 or MT230 rack; C51/ARC-4 remote control unit; DY10/ARC-4X, 12-24 v. dyamotor; state cond. and price. Walter L. Carlton, 1740 Cass St., Green Bay, Wis.

FOR SALE — Radio & TV business. Modern equipped. Good location. Write L. G. Collier, Box 577, Jacksonville, Ark.

TRADE OR SELL — Sylvania polymeter 134 with manual and diagram, excellent cond., $35. Want standard brand 3-speed portable phonograph and "45" player. Sahr Radio, Fairmont, Minn.

FOR SALE OR TRADE for 5" scope — in-circuit condenser checker Simpson 383 in A-1 cond., $79 when new, 6 months old. Make offer. Norman Wise, 2090 Hovey St., Gary, Ind.

FOR SALE — Eico 221 VTVM, wired and tested, $24.95; Electronics Measurements Corp. 203 tube tester, $15 fob. Paul Sturpe, R 1, Dalton, Ohio.

TRADE OR SELL — ST-202-A Stancor xmtr. and partially converted ARC 5 xmtr. Best offer or good hi-fi equip. takes everything. M. Goldman, 1530 S.W. 22 Terrace, Miami 45, Fla.

FOR SALE — All-speed Webcor changer with reluctance cartridge, diamond-sapphire needle, and 15" Hi-Fi speaker. Both unused, $25. Alex. M. Remer, 1175 Gerard Ave, New York 52, N. Y.

SELL OR SWAP — RME 50 comm. rcvr with matching spkr for Precision E-400 sweep gen. or E-300 gen. Also have all channel boosters, 4 stage: (BT), Regency DB 20; astatic; and single channel 10 (Katy) for Heathkits. E. H. Underwood, 2809 Clovis St., Bluefield, W. Va.

FOR SALE — General Radio Co. 1176-K frequency meter, 5-60,000 c. range; Measurements Corp. III xtal calibrator, 10, 1 and 0.25 Mcs. outputs, 0.001% accuracy. Both in excellent cond. Best cash offer. Charles E. Gumley, 7517 Morrow Rd., N.E., Albuquerque, N. M.

SELL OR SWAP — Heath T2 sig. tracer and Arkay G-2 sig. gen., A-1 cond., $16 each, or trade for late model tube tester. W. F. Onder, Rt. 2, Box 193, Arnold, Mo.

WANTED — Electro Voice FM booster. George A. Cahill, East Dennis, Mass.

FOR SALE — Heathkits (2); factory checked and calibrated and in perfect working cond.; TV pix tube checker, l. n., $20; grid dip meter GD-1A including low frequency kit, $15. A. Heshmati, 2800 W. Olive, Burbank, Calif.

FOR SALE — Globe Scout 65-A xmitter in working cond, assembled, $65; crystal mike, $6; key, $1. All fob. George Hoffman, Jr., U. S. Vet's Hospital, Florence, Mass.

FOR SALE — 1/4" Black & Decker drill with horizontal stand, perfect operating cond, $9.50 post paid. Robert Pearl, 1330 Eastern Parkway, Brooklyn 33, N. Y.

TRADE — Simpson AC voltmeter for condenser checker. Also want Photofact 201-7 for Philco TV AT 2272 code 123. J. Georgion, 1460 Grand Concourse, New York 57, N. Y.

FOR SALE — 60 uncartoned 6T8 tubes. Make cash offer or will trade all or part for modern TV tubes. Also 20 6CB6's; antique tubes, speakers, radios. T. Sassi, 446 Samuel Gortch Ave, Warwick, R. I.

FOR SALE — Eico: 425 scope 5", $35; 221 VTVM, $23; 320 sig. gen., $20. All for $70. Trani's TV Service, 545 Clinton St., Brooklyn 31, N. Y.

FOR SALE — 1/4" electric drill, Shopmate 1950 LG, 1800 rpm, excellent cond, with Jacobs geared chuck with key, $11. Gerald Lemond, 8038 Eastern Ave., Bell Gardens, Calif.

SELL OR TRADE — BC 455 with pr. supply for Heath VFO or AT 1 xmitter. Make offer. Joe Capell, Jr., 4329 Iowa Ave., Fresno 2, Calif.

FOR SALE — SCR 522 xmitter, rcvr, control box, plugs, and all tubes in original rack case, unmodified, $25. Arthur Marko, 429 East 70th St., New York 21, N. Y.

FOR SALE — 70-5 v. DC reversible tuning motors, Delco service part 5047577. George F. Zeidler, 1631 W. 33rd St., Chicago 8, Ill.

FOR SALE — Sams photofacts 201 to 289, 9 vol., in binders. l. n., books: Mandl's TV Servicing; TV For Radiomen; Basic TV; TV Simplified. Make offer. Jimmie Richardson, 1703 Charlotte Ave., Kinston, N. C.

SELL — Gonset communicator II, 6 v D C; $160; DX-100, $180; homebrew 6 m. converter, 7-11 Mc., with pwr. supply, $35. George Bronson, R 1, Box 240-A, Englishtown, N. J.

WANTED — Tube tester any cond.; C.R.T rejuvenator; Weston lightmeter; rolls of 8 mm old-time movie films. Irving Segal, 528 N. Vista St., Los Angeles 36, Calif.

FOR SALE — Globe Champion xmitter, 165 w. fone and CW; JT30 mike, 25 ham band crystals, coils 80-40-20, spare final tube and lopass filter, $175 fob. James E. Grubbs, 208 Taylor St., Barnesville, Ga.

FOR SALE — Jackson TVJ-2 TV sweep gen., marker calibrator, used 3 months, perfect cond., $150. B & B Radio & Electric, 316 So. Sixth St., Klamath Falls, Ore.

WANTED — Wallace's teleaides; Supreme TV manuals; tubes; Gonset super 6 converter. Dennis T. Willis, 1404 So. Jackson St., Tucumcari, N. M.

FOR SALE — Knight Space Banner shortwave and broadcast rcvr., in perfect cond., cabinet built, instructions and operating manual, $15. Daniel Seidler, 2644 W. 23 St., Chicago 8, Ill.

SELL OR TRADE — Ansley 10" TV new CRT needs little repairs; TV boosters; 38-40 Edison records A-1 cond., shipped cod. Need 2-speed tape recorder in good working cond. Bob's TV Radio Service, 67 Lafayette St., Plattsburg, N. Y.

FOR SALE — Columbia 33 1/3 rpm record player, hi-fi cartridge, $8; multimatch 200 w. mod. trans. and driver trans., $11; HT-18 NBFM VFO factory record, $38; 25 w. hi-fi amp and separate preamp, $35. H. Cushing, 16 Preston Dr., Manchester, Conn.

FOR SALE — Unused Emerson combination portable TV radio-mike input external speaker, model 1232, original price, $130, local only, $65. Paul Davis, 141-21-78 Rd., Flushing 67, N. Y.

WANTED — Short-wave rcvr. such as Hallicrafters S38 or 42 or similar. Have photo equip., test instruments for radio or TV; 20-station intercom. John Arnold, Wilson St., Bluffs 3, Ill.

WANTED — R.M.E. UHF 152 A converter in good cond. M. J. Thornhill, Hoschton, Ga.

FOR SALE — Regency RC-53 UHF converter in original box, $14.95 postpaid. Ben Mueller, Box 401, Nash Rd., Sanborn, N. Y.

FOR SALE — Sams 246 to 346 perfect cond., $100; 28 v., 150 amp. gen., $20; 1000 v. 375 ma dynamotor 28 v. input, $12. All plus shipping. Douglas W. Beaudoin, 403 North Monroe St., Watertown, Wis.

WANTED — Hi-Fi output transformer Acro TO-300; Stancor A-8072 or A-8054, or equal. State price and cond. Edwin C. Eisenbeis, 2813 Sheila Dr., Louisville 5, Ky.

WANTED — Portable typewriter. Will swap power trans. PM840; NRI Radio-TV course complete; Pontiac auto radio. Jimmy's Radio Service, Box 44, Parrott, Ga.

FOR SALE — QST, 1949-57; Radio-TV News, 1953-57; G-R Experimenter 1950-52; Aerovox Research Worker, 1950-57; Electronics, 1954-55; excellent cond., best offer for year or complete set, no single copies. R. H. Ives, R2-B32, Lynnhaven, Va.

TRADE — Weston 777 tube tester; RCA Designers Handbook; FM Transmission & Reception; Rider-Terman's Radio Engineering, others. Evan's Radio, Ola, Ark.

FOR SALE — Benwood-Linze 6 v. 20 amp. battery charger, $17.50; Ampro 16 mm sound projector, $115. Donald P. Bagren, 417 N. Winnebago, Rockford, Ill.

FOR SALE — FM-AM Zenith clock-radio; multimeter; sig. gen.; other electronic instruments. Send for list. Stanley Bombka, RR-3, Eagle River, Wis.

FOR SALE — Bud coils, 500 w. 1000 w., complete sets or part, cheap. C. Storch, 5 Winfield Terr., Great Neck, N. Y.

FOR SALE — Garrard RC80 changer, $20; Acme transistorized metal locator, $30; audio freq. meter, transis., $25; transvision VOM-VTVM, trans. fact. wired, $40, kit, $30. J. Chang, 127 Great East Neck Rd., Babylon, N. Y.

WANTED — Ham rcvr. and xmitter. Need complete gear for home station. Give full description and reasonable asking price or swap terms. Mack O. Santer, 544 East 6th St., New York 9, N. Y.

WANTED — RCA dynamic demonstrator III stock 182. Give price and cond. A. Carroll, 1320 "K" Ave., Cayce, S. C.

FOR SALE — Complete NRI Radio-TV course, sacrifice for $20. Higgins Radio-TV, R. 1, Grannis, Ark.

WANTED — Outdoor speakers; FM rcvr. 152-162; AC gen; walkie talkies; 6v. to 110 AC inverter; time clock; AM-FM tuner. S. Krzak, 65 Main, Pawtucket, R. I.

FOR SALE — Simpson 240 hammeter, AC-DC VOM, 1. n., $20; blower for final 115 vac cont. duty $8; Crown TV rotator indicator box brackets U-clamps, unused, $20. D. F. Phillips, Grandview Ave., Sellersville, Pa.

SACRIFICE — Complete Radio-TV communications course, National Radio School of Calif., bound and in excellent cond. Cost over $150. First $25 or swap for test equipment. Barbara Piller, 451 Thieriot Ave., Bronx 72, N. Y.

FOR SALE — Edison Standard phonograph, cylinder type, mfd. at Orange, N. J., May 2, 1888 — November 17, 1903. Other patents pending. Serial number S2 40431 with 35 cylinder records, dated 1904 and 1905. Vernon E. Hopler, 311 Dixon Ave., Boonton, N. J.

WANTED — Zenith, GE, or Emerson 7 or 8 tranistor pocket portable radio. Will swap Weston 772 super sensitive analyzer; Westinghouse type OA watt-hour meter, both in light maple portable carrying cases. L. Buddine, 1700 W. High St., Haddon Heights, N. J.

FOR SALE — Heathkit AR-2 communication rcvr. and 5" scope 0-10 complete with demodulator and low capacity probe; NRI Radio and TV course; Eico 6-12 v. battery eliminator 1050; sig. tracer RCP 777A. Charles Winlow, 393 Atlantic Ave., Monaca, Pa.

SWAP — 1950 Ford "6" Tudor for ham xmitter and rcvr. John Arleth, 3711 Deacon Ave., Pennsauken 5, N. J.

SELL OR TRADE — CREI courses complete Radio & TV Engineering. Want Pickering 190D pickup and test equip., preamp FM tuner. W. Bazewick, 11221 NE 9 Ct., Miami 38, Fla.

SELL OR TRADE — Pan-American French ham and case for Globe Scout xmitter and/or A-1 communications rcvr. Also have 15 w hi-fi Olson amplifier. Paul Reuter, R 2, Robinson, Ill.

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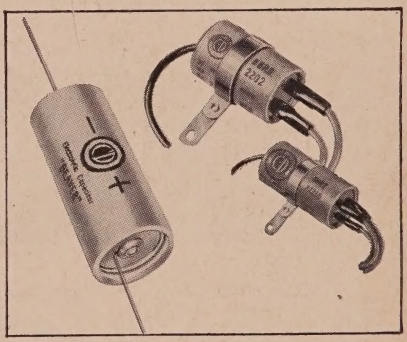
"Blue Beaver"® Electrolytics

Cornell-Dubilier's "Blue Beavers" are the serviceman's very own. They're sold only through authorized C-D Distributors. Full profit and complete customer satisfaction comes only with "Blue Beaver" Electrolytics. They are a truly *exclusive* capacitor—exclusive in quality and long life performance—and made only by C-D, *exclusively* for the service trade. Ask your nearby C-D Distributor for catalog or write direct to Cornell-Dubilier Electric Corporation, South Plainfield, N. J.



Cornell-Dubilier capacitors

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